Radial artery access: Tips and tricks on reduction and management of complications

Dr Michael Liang, MBChB, FRACP, FAMS, FACC

Department of Cardiology, Khoo Teck Puat Hospital Singapore.
Disclosure/Conflict of Interests

NONE
Transradial Complications – How Common?

• Transradial coronary procedures are default access in many centres due to ↓ major bleeding and ↑ patient’s comfort.

• In RIVAL trial: 1.4% major complication rate.

<table>
<thead>
<tr>
<th>Major vascular complications at 30 days</th>
<th>Radial (n=3507)</th>
<th>Femoral (n=3514)</th>
<th>HR (95% CI)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large haematoma</td>
<td>42 (1.2%)</td>
<td>106 (3.0%)</td>
<td>0.40 (0.28–0.57)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Pseudoaneurysm needing closure</td>
<td>7 (0.2%)</td>
<td>23 (0.6%)</td>
<td>0.30 (0.13–0.71)</td>
<td>0.006</td>
</tr>
<tr>
<td>Arteriovenous fistula</td>
<td>0 (0%)</td>
<td>5 (0.1%)</td>
<td>..</td>
<td>..</td>
</tr>
<tr>
<td>Ischaemic limb needing surgery</td>
<td>1 (0%)*</td>
<td>0 (0%)</td>
<td>..</td>
<td>..</td>
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</tbody>
</table>

Lancet 2011; Apr 23;377(9775):1409-20
Complications from Transradial Interventions

• Mostly access site or vascular complications

• Radial artery spasm

• Radial artery spasm with arterial dissection and/or perforation
Radial Artery Spasm – Prior to Procedure

- Operator: Experience.
- Patients:
  - Small radial artery
  - Anxious patient

- Prevention:
  - **Pre-procedural sedation:** 1 – 2.5mg IV Midazolam or 25-50mcg IV Fentanyl.
  - **Intra-arterial vasodilators** 200 mcg GTN and/or 2.5mg Verapamil (operator preference).
  - **Smaller sheath** e.g. Terumo GlideSheath Slender Hydrophilic Introducer Sheath (6 Fr Sheath with a 5 Fr outer diameter.)

- Spasm during puncture
  - Attempt sedation, intra-dermal GTN, ultra-sound (USS) guided puncture.
Example of USS guided radial puncture

- 58 yo man presented with ACS.
- Struggle puncture by resident doc.
- Pulse not well palpable.
- No “flush back”
- Injected 100mcg GTN under the skin around the intended puncture site.
Case: Radial Artery Spasm with Perforation

- 57yr M
- Indication: Anterior STEMI
  - Rescue angioplasty

Cardiac Risk Factors
- Dyslipidaemia, hypertension

Coronary Angiography
- 6 Fr Right radial approach.
- BP 100/70
- 5 Fr JL3.5 and JR4 diagnostic catheters
Proximal LAD bifurcation lesion.

RCA free of significant disease.
Could not advance 6 Fr EBU3.5 Guiding Catheter
Radial artery spasm and perforation

- ? Blood pressure cuff
- ? Change to femoral ?
- Already given
  - Thrombolysis < 3 hours
  - IV heparin bolus 5000 IU.

260 cm 0.035” Exchange J wire in place
Used 7.5 Fr PB3.5 Sheathless EauCath

- Smoothly advanced the EauCath through the radial artery.

- Used 7.5 Fr in case bifurcation stenting required.

Dilator with tapered tip

Hydrophilic coating

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Predilate LAD and Diagonal with 2x15 mm Mini Trek
Mini-crush Technique, with POT (proximal optimization technique)
2.75x15 mm NC @ 10 atm

3x15 mm NC @ 10 atm

Final Results
Radial artery angiography was satisfactory
Radial artery perforation/spasm – Tips and Tricks

- If repeated IA GTN and Verapamil with additional sedation (midazolam) and Fentanyl didn’t work
Radial artery spasm +/- perforation

• Option 1 (preferred)
  • Sheathless EauCath
  • Pros
    – No need to swap 0.035” J wires
    – Relatively quick
    – Can be used for diagnostic procedures

• Option 2
  • Balloon Assisted Technique (Patel T. et al).
    – Need to re-wire or exchange wire with an angioplasty wire to load an angioplasty balloon.
    – Experiences of interventional equipment required.
• EauCath

(Razor effect)

Tapered-dilator at the tip of the hydrophilic EauCath Catheter

(Balloon-assisted tracking)

Patel T et al. CCI 2009

• BAT
# Sheathless EauCath – personal experience

<table>
<thead>
<tr>
<th>Patients with radial artery spasm and/or perforation</th>
<th>n (%)</th>
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</thead>
<tbody>
<tr>
<td>Radial artery spasm</td>
<td>36 (100)</td>
</tr>
<tr>
<td>Radial artery spasm with anomaly (e.g. high origin)</td>
<td>19 (53)</td>
</tr>
<tr>
<td>Radial artery spasm with more than mild tortuosity</td>
<td>8 (22)</td>
</tr>
<tr>
<td>Radial artery perforation</td>
<td>11 (31)</td>
</tr>
<tr>
<td>Initial Sheath size</td>
<td></td>
</tr>
<tr>
<td>5 Fr</td>
<td>8 (22)</td>
</tr>
<tr>
<td>6 Fr</td>
<td>28 (78)</td>
</tr>
<tr>
<td>Failed catheter to cross</td>
<td></td>
</tr>
<tr>
<td>4 Fr catheter</td>
<td>2 (6)</td>
</tr>
<tr>
<td>5 Fr catheter</td>
<td>16 (44)</td>
</tr>
<tr>
<td>6 Fr catheter</td>
<td>18 (50)</td>
</tr>
<tr>
<td><strong>Sheathless EauCath Success</strong></td>
<td>36 (100)</td>
</tr>
<tr>
<td><strong>Crossover to conventional catheter or femoral approach</strong></td>
<td>0 (0)</td>
</tr>
<tr>
<td><strong>Complication (bleeding or haematoma)</strong></td>
<td>0 (0)</td>
</tr>
<tr>
<td><strong>Residual perforation (evidence of contrast extravasation)</strong></td>
<td>1 (9)</td>
</tr>
</tbody>
</table>
Case: 56yr F, NSTEMI. 6 Fr radial sheath.

- Diagnostic 5 Fr JL3.5 and JR4.
  - 5000 IU heparin administered.

- Culprit lesion – Mid left circumflex artery.

- Proceed to PCI.
• Unable to advance a 5 Fr EBU3.5 guiding catheter.

• Injection from the Guiding catheter at radial artery
6.5 Fr PB3.5 Sheathless EauCath

- Advancement is smooth without resistance.
Blood ooze at the access site

- 6 Fr Sheath d. (2.62 mm)
- 6.5 Fr Eaucath (2.16 mm)
- TR band with low pressure

Tips & Tricks
6.5 Fr EauCath Can be inserted into 6 Fr Sheath

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No residual contrast extravasation.
Case: small high take off radial artery

- 45 yr Man
- Anterior STEMI.
- Diagnostic 5 Fr JR4 for RCA which was normal.
- Standard 150cm J wire.
- Unable to pass an 6 Fr EBU3.5 guiding catheter above elbow.
- Noted high radial take off.
• 0.014” Sion Blue 180cm wire.
• 6.5 Fr Sheathless PB3.5 guiding catheter.
• EauCath advanced through without much resistance.
LAD PCI completed
• No active contrast extravasation

• Learning point: Use of long exchange J wire or 180cm Rosen.
Option 2: Balloon-assisted technique (BAT)

- A case of radial artery spasm with perforation.
- 6 Fr JL3.5 guiding catheter would not cross.
Option 2: BAT

- Recommended to use a small 4 Fr or 5 Fr catheter via J wire (if still present) to exchange to a 0.014 Angioplasty wire.
- 2x15 mm balloon as shown.
Option 2: BAT

Advance balloon and guide together.

Pay attention to the tip of wire.
Option 2: BAT

- No residual contrast extravasation.
Case: BAT for high take off radial artery spasm

Unable to advance 6 Fr EBU 3.5 guiding catheter. 5 Fr TIG was able to pass through and the 0.035” J-wire was exchanged for a 0.014” Sion Blue wire
2x15mm compliant balloon half-way out of guiding catheter inflated at 4 atm.

FFR LAD 0.76
Proceeded with PCI

3.5x16mm DES
• Final shot from the guiding catheter.
Take home message

- Both Sheathless EauCath and balloon assisted technique can be considered in the situation of radial artery spasm +/- perforation and may reduce the chance of developing large haematoma.
  - Both techniques can be mastered with a short learning curve.
  - Not suitable in small radial artery <1.25 mm or extreme tortuosity e.g. 360 deg turn unable to be straightened with wire.